

**REMARKS**

Reconsideration and allowance of the above-identified application are respectfully requested.

Applicants respectfully note that there were two claims numbered "26" and two claims numbered "27" in original claims 1-190. Applicants have renumbered the original claims 26 (second instance) to 190 as claims 28 to 192, merely so that the claims are presented in increasing numerical order. These amendments do not narrow or otherwise limit the scope of the claims and are not made for any purpose related to patentability. No new matter has been introduced by way of these amendments. It is respectfully noted that the claims will be referred to herein in accordance with their renumbering.

Claims 1-192 are currently pending, wherein claims 1, 15, 29, 43, 55, 69, 83, 97, 109, 121, 133, 145, 157, 169 and 181 are independent. Claims 11, 12, 25, 26 and 28-192 have been amended.

Claims 11, 12, 25, 26, 39, 40, 53, 54, 65, 66, 79, 80, 93, 94, 107, 108, 119, 121, 131, 133, 143, 144, 155, 156, 167, 168, 179, 180, 191, and 192 have been amended merely to correct trivial spelling errors in these claims. These amendments do not narrow or otherwise limit the scope of the claims and are not made for any purpose related to patentability. No new matter has been introduced by way of these amendments.

Applicants note with appreciation the acknowledgment by the Patent Office of the Information Disclosure Statements previously submitted to the Patent Office.

Applicants would like to thank Examiner Guy LaMarre for the personal interview conducted on February 17, 2005. In compliance with M.P.E.P. § 713.04, the substance of

that interview is incorporated in the foregoing amendments to the claims and in the following remarks.

In Section 1.1 of the Office Action, claims 43-54 are rejected under 35 U.S.C. § 101 as allegedly claiming non-statutory subject matter. Applicants hereby amended claim 43 to recite that the parity check matrix is embodied in a medium. This amendment does not narrow or otherwise limit the scope of the claims. Support for this amendment can be found at least on page 15, lines 7-14 of the present application. No new matter has been introduced by way of this amendment. Accordingly, reconsideration and withdrawal of this ground of rejection are respectfully requested.

In Section 2 of the Office Action, the title of the present application is objected to, because it is alleged that the title of the invention is not descriptive. This objection is respectfully traversed.

According to M.P.E.P. § 606, “[t]he title should be brief but technically accurate and descriptive . . . .” It is respectfully submitted that the present title satisfies the mandates of M.P.E.P. § 606. For example, as disclosed by the present application, “[t]he present invention relates generally to a *parity check matrix* for a linear block encoder and decoder in a data transmission system. More particularly, the present invention relates to a *parity check matrix and method of forming thereof* for a low-density parity-check code (LDPC) encoder for a write channel and decoder for a read channel in a disk drive system.” [present application, page 2, line 27 – page 3, line 2 (emphasis added)] Furthermore, it is respectfully noted that present application recites numerous claims that recite the feature of a parity check matrix (see, e.g., claims 1-42 and 55-96), numerous claims directed to a parity check matrix (see, e.g., claims 43-54), and numerous claims directed to a method or computer program for

generating such a parity check matrix (see, e.g., claims 97-192). Accordingly, it is respectfully submitted that the present title satisfies the requirements of being “brief,” “technically accurate,” and “descriptive.” Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

During the interview, the Patent Office clarified its position. The Patent Office asserted that the title must contain a recitation of the distinguishing features of the parity check matrix of the present invention. However, it is respectfully submitted that the Patent Office's assertion is unfounded and has no basis under the requirements of the patent laws and rules, particularly M.P.E.P. § 606.

If this objection is repeated, the Patent Office is requested to specifically specify how the title is not descriptive and the basis for its assertions regarding the content of the title, particularly when such assertions are clearly contrary to the disclosure of the present application and established patent laws and rules.

In Section 2.1 of the Office Action, the Patent Office requests that the serial numbers of the patent applications listed in the disclosure be updated. Applicants hereby modify the specification merely to update the serial numbers of the aforementioned patent applications. No new matter has been introduced by way of these amendments. Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

In Section 2.1.1, the Patent Office asserts that the attempt to incorporate subject matter into the present application by reference is allegedly improper, because the relevant documents have not been submitted to the Patent Office. This objection is respectfully traversed.

It is respectfully submitted that the assertions made by the Patent Office are not a proper statement of the laws regarding incorporation by reference, and, as such, are wholly and completely without foundation under established patent laws and rules.

According to 37 C.F.R. § 1.57, an incorporation by reference must express “a clear intent to incorporate by reference using the root words ‘incorporate(e)’ and ‘reference’ (e.g., ‘incorporate by reference’); and . . . [c]learly identify the referenced patent, application, or publication.” [37 C.F.R. § 1.57(b); *see also* M.P.E.P. § 608.01(p)] It is respectfully submitted that Applicants have satisfied all requirements for incorporation by reference of the given material, and, therefore, such incorporations are proper and in complete compliance with the mandates of 37 C.F.R. § 1.57.

In addition, a review of the requirements of incorporation indicates that there is absolutely no basis for the assertion that an incorporation by reference is not proper if the relevant documents have not been submitted to the Patent Office. It is respectfully submitted that the Patent Office is reading requirements into the patent laws and rules that do not exist.

Rather, according to 37 C.F.R. § 1.57,

[t]he examiner *may* require the applicant to supply a copy of the material incorporated by reference. If the Office requires the applicant to supply a copy of material incorporated by reference, the material must be accompanied by a statement that the copy supplied consists of the same material incorporated by reference in the referencing applications.” [37 C.F.R. § 1.57(e) (emphasis added)]

Thus, although the Patent Office *may* require the Applicant to supply a copy of the material incorporated by reference, such a request does not make the incorporation by reference improper. Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

If this objection is repeated, the Patent Office is requested to point out the precise rule, the exact section of the M.P.E.P., as well as the sentences within that section relied upon to support such an unfounded assertion.

However, to facilitate prosecution in the present application, Applicants hereby submit copies of all documents incorporated by reference in the present application. In compliance with 37 C.F.R. § 1.57(e), it is respectfully submitted that the copies of all supplied documents consist of the same material incorporated by reference in the present application.

In Section 2.1.2 of the Office Action, the Patent Office expresses confusion regarding why the minimum Hamming distance  $d_{\min} = 2$  for the SPC matrix of equation (4) illustrated on page 4, and discussed at page 4, line 25 of the present application. As discussed during the interview, the Hamming distance of the SPC matrix is a *minimum* Hamming distance. In other words,  $d_{\min} = 2$  is a minimum bound on the Hamming distance of the SPC matrix. The dimension of the SPC matrix is  $M \times N$ . Since the number of rows and columns of the matrix are variable, the SPC matrix can have a *minimum* Hamming distance of  $d_{\min} = 2$ . The *actual* Hamming distance of the SPC matrix will depend on the choice of  $M$  and  $N$  and the resulting size of the SPC matrix.

The Patent Office also expresses confusion as to what is meant by “no period-4 cycles.” As discussed during the interview, and as illustrated in the example factor graph of FIG. 3 of the present application, the factor graph contains two types of nodes: the bit node (e.g.,  $b_1$ ,  $b_2$ ,  $b_3$ , and  $b_4$ ) and the check nodes (e.g.  $e_1$ ,  $e_2$ ). Each bit node corresponds to a bit in the codeword, and each check node represents a parity-check equation (i.e., a row in the parity check matrix  $\mathbf{H}$ ). Thus, the factor graph for an LDPC code with an  $M \times N$  parity check

matrix **H** contains M check nodes and N bit nodes. An edge between a check node and a bit node exists if and only if the bit participates in the parity-check equation represented by the check node. [see present application, page 3, line 24 to page 4, line 1] Additionally, “[a] cycle in a factor graph refers to a finite set of connected edges that start and end at the same node. The bold lines in Fig. 3 represent a cycle length of four. As can be appreciated by one of ordinary skill in the art, four is the shortest cycle length a parity check matrix can have.” [present application, page 4, lines 4-7] According to exemplary embodiments, the Applicants have observed that the existence of “period-4 cycles” causes degradation in performance of sum-product decoding algorithms. [present application, page 12, lines 2-4] Thus, the parity check matrix according to exemplary embodiments contains no cycle lengths of four, or, in other words, no period-4 cycles.

Additionally, merely to facilitate prosecution in the present application, Applicants have amended the specification to clarify that the partial identity matrix of equation 8A illustrated on page 13 of the present application comprises a rank of 3, to resolve the confusion on the part of the Patent Office.

Accordingly, reconsideration and withdrawal of these grounds of objection are respectfully requested.

In Section 2.2 of the Office Action, the Patent Office objects to the abstract of the disclosure. Applicants hereby amend the abstract to clarify the language used therein, and to replace the word “comprising” with “including.” It is respectfully submitted that terms such as “M tiers,” “Dmin,” and “tc” are clear from the abstract. For example, the abstract discloses that the parity check matrix includes M tiers, “wherein  $M \geq 2$ .” The term “Dmin” is disclosed in the abstract as “the minimum Hamming distance” of the parity check matrix.

Additionally, the term “tc” is disclosed in the abstract as “the column weight” of the parity check matrix. As such, it is respectfully submitted that the abstract is a concise statement of the technical disclosure of the present application and “enable[s] the reader . . . to determine quickly from a cursory inspection of the nature and gist of the technical disclosure,” in full compliance with the mandates of the patent laws and rules. [M.P.E.P. § 608.01(b)] Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

The Patent Office asserts that the abstract should “describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.” [Office Action, page 1 – page 2] However, it is respectfully submitted that such an assertion is not a proper statement of the requirements of either M.P.E.P. § 608.01(b) or 37 C.F.R. § 1.72. If this objection is repeated, the Patent Office is requested to specifically point out the precise rule, the exact section of the M.P.E.P., as well as the sentences within that section relied upon to support such an unfounded requirement.

In Section 3 of the Office Action, the Patent Office objects to the drawings. Applicants hereby amend Figures 1, 1A, 2 and 3 to add the label “Related Art” to each of these figures. In addition, the Patent Office notes that A/D converter 502 should be included in the box of receiver 500. [see Office Action, page 10] As the present application discloses that “[r]eceiver 500 comprises an analog to digital converter 502,” Applicants hereby amend Figures 1 and 2 to enclose A/D converter 502 in the boxes for receiver 500 and 500’, respectively. Consequently, Applicants hereby submit four (4) sheets of formal drawings for Figures 1-3 for review by the Patent Office in connection with the above-identified application, each sheet marked “REPLACEMENT SHEET.” Should the enclosed drawings

require changes, it is respectfully requested that the Patent Office notify the undersigned of same.

The Patent Office also asserts that Block 500' is not seen in Figure 1, as described on page 10 of the present application. [see Office Action, page 2] Applicants respectfully note that the indicated passage of the present application refers to receiver 500' as illustrated in Figure 2, not Figure 1. However, Applicants hereby amend the specification merely to clarify that the receiver being discussed at the given point in the present application noted by the Patent Office is the receiver 500' illustrated in Figure 2.

Accordingly, reconsideration and withdrawal of these grounds of objection are respectfully requested.

In Section 4 of the Office Action, claim 169 is objected to for including a "method for generating a method." This objection is respectfully traversed.

According to M.P.E.P. § 2173.02,

[t]he examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph, is whether the claim meets the threshold requirements of clarity and precision, *not* whether more suitable language or modes of expression are available. . . . Some latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire. Examiners are encouraged to suggest claim language to applicants to improve the clarity or precision of the language used, *but should not reject claims or insist on their own preferences if other modes of expression selected by applicants satisfy the statutory requirement.* [M.P.E.P. § 2173.02 (emphasis added)]

Given the "latitude in the manner of expression and the aptness of terms" afforded to the Applicants, it is respectfully submitted that the aforementioned claims are clear and precise and fully comply with the requirements of 35 U.S.C. § 112, second paragraph.



Consequently, Applicants respectfully submit that there is no statutory basis for the objections to the claims based on “informalities.”

However, to facilitate prosecution in the present application, Applicants hereby amend claims 169 and 181 merely to address the informalities noted by the Patent Office. These amendments do not narrow or otherwise limit the scope of the claims, are not made for any purpose related to patentability or to satisfy any statutory requirement, and are fully supported by the present application. No new matter has been introduced by way of these amendments. Accordingly, reconsideration and withdrawal of these grounds of objection are respectfully requested.

In Section 5.1 of the Office Action, claim 1-192 are rejected under 35 U.S.C. § 112, second paragraph, because “it is not clear to the Examiner what is meant by: cycle-4=0, tc is column height/weight, tiers of element. It is not clear what values Dmin takes on for M>3.” [Office Action, page 2]

According to M.P.E.P. § 2173.01,

[a] fundamental principal contained in 35 U.S.C. 112, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose *so long as any special meaning assigned to a term is clearly set forth in the specification . . . .* Applicant may use functional language, alternative expressions, negative limitations, or any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought. As noted by the court in *In re Swinehart*, 439 F.2d 210, 160 USPQ 226 (CCPA 1971), a claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought. [M.P.E.P. § 2173.01 (emphasis added)]

Furthermore,

[t]he meaning of every term used in a claim should be apparent from the prior art or from the specification and drawings at the time the application is filed . . . . *When the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning, in order to*

achieve a complete exploration of the applicant's invention and its relation to the prior art. [M.P.E.P. § 2173.05(a) (emphasis added)]

Therefore, given the "latitude in the manner of expression and the aptness of terms" afforded to the Applicants, and that the meaning of every term recited in the claims is clearly set forth in the specification, it is respectfully submitted that claims 1-192 are clear and precise and fully comply with the requirements of 35 U.S.C. § 112, second paragraph.

For example, as discussed previously, the parity check matrix according to exemplary embodiments contains no cycle lengths of four, or, in other words, no period-4 cycles. [*see* present application, page 3, line 24 to page 4, line 1; page 4, lines 4-7; and page 12, lines 2-4] Thus, "cycle - 4 = 0" for the parity check matrix recited in the claims of the present application. Additionally, with reference to the feature of "tc = M, wherein tc is the column weight," the attention of the Patent Office is directed to page 4, lines 22-23 of the present application, which discloses that "[c]olumn weight tc refers to the number of '1's in each column." In addition, with respect to the tiers of elements, the present application discloses that

[t]he parity matrix can be generalized as comprising M tiers ( $M \geq 2$ ), each tier i comprising a row of identity matrixes  $I_{P_i}$  of rank  $P_i$ . The matrix is arranged such that  $P_1 < \dots < P_i < \dots < P_M$  and  $P_1, P_i, P_M$  are mutually prime. The number of columns in the preferred matrix is less than or equal to  $(P_1 \times P_2)$ . [present application, page 12, lines 18-21]

Regarding the confusion on the part of the Patent Office regarding the values  $D_{min}$  takes on for  $M > 3$ , it is respectfully noted that two clauses in the conjunctive are recited for the values of  $D_{min}$  for the parity check matrix according to exemplary embodiments: " $D_{min} = 2 * M$  for  $M = 1..3$ " or " $2 * M \geq D_{min} \geq 6$  for  $M > 3$ ." Thus,  $D_{min}$  can take on certain values when  $M = 1, 2, 3$ , and can take on other values when  $M > 3$ .

Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

In Section 5.2, claims 1, 15, 27, 53, 67, 81, 95, 107, 131, 143 and 167 are rejected under 35 U.S.C. § 112, second paragraph. In particular, with regard to claims 1, 15, 27, 53, 67, 81 and 167, “[i]t is unclear to the Examiner what hardware component a matrix is . . . .” [Office Action, page 2] It is respectfully submitted that no such requirement exists under the mandates of 35 U.S.C. § 112, second paragraph.

According to M.P.E.P. § 2106,

Applicant's claims, interpreted in light of the disclosure, must reasonably apprise a person of ordinary skill in the art of the invention. However, the applicant need not explicitly recite in the claims every feature of the invention. For example, if an applicant indicates that the invention is a particular computer, the claims do not have to recite every element or feature of the computer. In fact, it is preferable for claims to be drafted in a form that emphasizes what the applicant has invented (i.e., what is new rather than old). [M.P.E.P. § 2106 (citations omitted)]

Accordingly, it is respectfully submitted that the claims of the present application “reasonably apprise a person of ordinary skill in the art of the invention.” Additionally, it is respectfully submitted that Applicants have recited claims that emphasize what the Applicants have invented. For example, it is noted that claim 1 recites, among other features, a parity check matrix having several unique attributes, a linear block encoder that encodes user data “in response to said parity check matrix,” and a soft linear code decoder that decodes data decoded by a soft channel decoder “in response to said parity check matrix.” Accordingly, it is respectfully submitted that the claims of the present application “reasonably apprise a person of ordinary skill in the art of the invention,” in full and complete compliance with the mandates of 35 U.S.C. § 112, second paragraph.

If this rejection is repeated, the Patent Office is requested to point out the precise law and/or rule, the exact section of the M.P.E.P., as well as the sentences within that section relied upon to support the Patent Offices unfounded requirement.

With respect to the rejection of claims 97 and 133, these claims have been amended merely to change the phrase “from to” to “from” to correct a trivial spelling error in these claims. These amendments do not narrow or otherwise limit the scope of the claims. No new matter has been introduced by way of these amendments.

Regarding the confusion expressed by the Patent Office with respect to claims 109 and 145, it is respectfully submitted that the feedback relationship recited in steps (a) and (c) of these claims is clearly illustrated between soft channel decoder 504 and soft linear block code decoder 506 in FIGS. 1 and 2 of the present application, and is clearly set forth in the specification on page 11, lines 1-10 of the present application. However, merely to facilitate prosecution in the present application, these claims have been amended merely to clarify that the data received *from the communication channel* is soft channel decoded in accordance with the data decoded in step (c), and that the data decoded in step (a) is soft linear block code decoded in accordance with the generated parity check matrix. These amendments do not narrow or otherwise limit the scope of the claims and are not made for any purpose related to patentability. No new matter has been introduced by way of these amendments.

Therefore, given the “latitude in the manner of expression and the aptness of terms” afforded to the Applicants, and that the meaning of every term recited in the claims is clearly set forth in the specification, it is respectfully submitted that claims 1, 15, 27, 53, 67, 81, 95, 107, 131, 143 and 167 are clear and precise and fully comply with the requirements of 35

U.S.C. § 112, second paragraph. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

In Section 6.1, claims 1-192 are provisionally rejected under the judicially-created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 22, 63, 72, 111, 120, 158 and 166 of co-pending U.S. Patent Application Serial No. 09/730,596. This rejection is respectfully traversed.

According to M.P.E.P. § 804,

[i]n determining whether a nonstatutory basis exists for a double patenting rejection, the first question to be asked is – does any claim in the application define an invention that is merely an obvious variation of an invention claimed in the patent? . . . Obviousness-type double patenting requires rejection of an application claim when the claimed subject matter is **not patentably distinct** from the subject matter claimed in a commonly owned patent when the issuance of a second patent would provide unjustified extension of the term of the right to exclude granted by a patent. [M.P.E.P. § 804 (citations omitted) (emphasis in original)]

For example, the following Table 1 lists pending claim 43 of the present application and pending claim 22 of U.S. Patent Application No. 09/730,597:

**TABLE 1**

Pending Claim 43 of Present Application	Pending Claim 22 of U.S. Patent Application No. 09/730,597
<p>43. A parity check matrix embodied in a medium for one of a low-density parity-check encoder and a low-density parity-check decoder, comprising:</p> <p style="padding-left: 40px;">M tiers,</p> <p style="padding-left: 80px;">wherein <math>M \geq 2</math>,</p> <p style="padding-left: 40px;"><math>D_{min} = 2 * M</math> for <math>M = 1..3</math> or</p> <p style="padding-left: 80px;"><math>2 * M \geq D_{min} \geq 6</math> for <math>M &gt; 3</math>,</p> <p style="padding-left: 80px;">wherein <math>D_{min}</math> is the minimum Hamming distance,</p> <p style="padding-left: 40px;"><math>t_c = M</math>,</p> <p style="padding-left: 80px;">wherein <math>t_c</math> is the column weight, and</p>	<p>22. A data transmission system for transmitting user data to and receiving data from a communication channel, comprising:</p> <p style="padding-left: 40px;">a low-density parity-check code encoder to encode user data <math>u</math> of length <math>N_u</math>, by inserting parity data <math>p</math> of length <math>N_p</math> into output data <math>c</math> of length <math>N</math> in accordance with a parity matrix <math>H</math> such that <math>H \cdot c = 0</math>, comprising:</p> <p style="padding-left: 80px;">an input to input the user data of block length <math>N_u</math>;</p> <p style="padding-left: 80px;">an <math>H \cdot c</math> decomposer to decompose <math>H \cdot c</math> into a first component <math>H_u \cdot u</math> corresponding to</p>

cycle - 4 = 0.	the user data and a second component $\mathbf{H}_p \cdot \mathbf{p}$ corresponding to the parity data such that $\mathbf{H}_u \cdot \mathbf{u} + \mathbf{H}_p \cdot \mathbf{p} = 0$ ; a $\underline{u}$ calculator to calculate a vector $\underline{u} = \mathbf{H}_u^{-1} \cdot \mathbf{u}$ ; and a $\mathbf{p} = \mathbf{P} \underline{u}$ calculator to calculate $\mathbf{p} = \mathbf{H}_u^{-1} \cdot \mathbf{u}$ ; a transmitter to transmit an output of said low-density parity-check code encoder to the communication channel; a soft channel decoder to decode data from the communication channel; and a soft low-density parity-check code decoder to decode data decoded by said soft channel decoder.
----------------	---

Given the recitation of the claims in Table 1, Applicants respectfully submit that the Patent Office has not met its burden of establishing that pending claim 43 of the present application defines an invention that is merely an obvious variation of an invention claimed in claim 22 of U.S. Patent Application No. 09/730,597. The Patent Office asserts that the features of claim 43 of the present application are allegedly incorporated into the transmission system of co-pending claim 22. The Patent Office states that

[i]t would have been obvious to those in possession of the invention defined by the claims of co-pending US patent application No. 09/730,597 to have such matrix generator inclusion. Those in possession of the invention would have been motivated to use [the] matrix generator as recited in claim 22 of the copending Application No. 09/730,597 in order to speed up data processing and reduce data processing hardware. [Office Action, page 3]

As is evident from Table 1, Applicants respectfully note that *nowhere* does pending claim 22 of U.S. Patent Application No. 09/730,597 recite the features of the parity check matrix recited in claim 43 of the present application. Rather, it is respectfully submitted that the Patent Office is using unmitigated, unequivocal and impermissible hindsight to reach its

determination of obviousness-type double patenting. [see M.P.E.P. §§ 2142, 2143.01 and 2145] Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

During the interview, the Patent Office stated that it would carefully review the obviousness-type double patenting rejection, based on the comparison of the claims in Table 1.

If this rejection is repeated, the Patent Office is requested to address how it can assert that the features of claim 43 of the present application are allegedly incorporated into the transmission system of co-pending claim 22, given the comparison of the claims in Table 1.

In Section 7.2 of the Office Action, claims 1-192 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the admitted prior art, Tanner (U.S. Patent No. 4,295,218, hereinafter "Tanner") in view of Roohparvar (U.S. Patent No. 5,973,900, hereinafter "Roohparvar") and further in view of McClure (U.S. Patent No. 5,493,532, hereinafter "McClure"). This rejection is respectfully traversed.

Applicants respectfully note that Roohparvar and McClure do not correspond to the patent numbers cited by the Patent Office, and neither reference is discussed or otherwise used in the Office Action. During the interview, the Patent Office clarified that the use of Roohparvar and McClure was in error due to a drafting mistake on the part of the Patent Office in preparing the present Office Action, and should not have been included in the rejection. Consequently, Applicants will respond to the rejection based on only the admitted prior art and Tanner.

Exemplary embodiments of the present invention are directed to a parity check matrix for a linear block encoder and decoder in a data transmission system. According to an

exemplary embodiment, a data transmission system for transmitting user data to and receiving data from a communication channel includes the parity check matrix. The parity check matrix includes  $M$  tiers, where  $M \geq 2$ . The parity check matrix includes  $D_{\min} = 2 * M$  for  $M=1..3$ , or  $2*M \geq D_{\min} \geq 6$  for  $M > 3$ .  $D_{\min}$  is the minimum Hamming distance. The parity check matrix includes  $t_c=M$ , where  $t_c$  is the column weight. The parity check matrix includes no period-4 cycles. The linear block encoder encodes the user data in response to the parity check matrix, and a transmitter transmits an output of the linear block encoder to the communication channel. A soft channel decoder decodes data, and a soft linear block code decoder to decode data decoded by the soft channel decoder in response to the parity check matrix.

It is respectfully submitted that nowhere does the admitted prior art disclose or suggest a parity check matrix as recited in, for example, claim 1 of the present application. During the interview, the Patent Office agreed that the admitted prior art does not disclose or suggest the features of a parity check matrix as recited in, for example, claim 1 of the present application.

In addition, it is respectfully submitted that nowhere does Tanner disclose or suggest a parity check matrix as recited in, for example, claim 1 of the present application. During the interview, the Patent Office clarified its position. The Patent Office stated that the Tanner reference was cited due to the Patent Office's confusion regarding the recitation of certain features of the parity check matrix in the claims of the present application. However, as the Patent Office's confusion was resolved during the interview, the Patent Office agreed that Tanner does not disclose or suggest the features of a parity check matrix as recited in, for example, claim 1 of the present application.



Furthermore, according to M.P.E.P. § 2143, to establish a *prima facie* case of obviousness, three basic criteria must be met. “First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.” [M.P.E.P. § 2143] In other words, “[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art.” [M.P.E.P. § 2143.01] It is respectfully submitted that there is no suggestion or motivation, either implicitly or explicitly, to combine the admitted prior art and Tanner in the manner suggested by the Patent Office. It is respectfully submitted that the Patent Office has also failed to establish a *prima facie* case of obviousness.

Independent claims 15, 29, 43, 55, 69, 83, 97, 109, 121, 133, 145, 157, 169 and 181 recite features similar to those recited in independent claim 1, and are, therefore, patentably distinguishable over the combination of the admitted prior art and Tanner for at least those reasons stated above with regard to claim 1.

Dependent claims 2-14, 16-28, 30-42, 44-54, 56-68, 70-82, 84-96, 98-108, 110-120, 122-132, 134-144, 146-156, 158-168, 170-180 and 182-192 variously depend from independent claims 1, 15, 29, 43, 55, 69, 83, 97, 109, 121, 133, 145, 157, 169 and 181, and are, therefore, patentably distinguishable over the combination of the admitted prior art and Tanner for at least those reasons stated above with regard to claims 1, 15, 29, 43, 55, 69, 83, 97, 109, 121, 133, 145, 157, 169 and 181.

For at least the foregoing reasons, it is respectfully submitted that the combination of the admitted prior art and Tanner does not render the subject matter of claims 1-192 obvious. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

All of the objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and a notice to that effect is earnestly solicited. Should the Examiner have any questions regarding this response or the application in general, the Examiner is urged to contact the Applicant's attorney, Andrew J. Bateman, by telephone at (202) 625-3547. All correspondence should continue to be directed to the address given below.

Respectfully submitted,

By: Andrew J. Bateman  
Andrew J. Bateman  
Attorney for Applicant  
Registration No. 45,573

IP Docket  
Katten Muchin Zavis Rosenman  
1025 Thomas Jefferson St., NW  
East Lobby, Suite 700  
Washington, DC 20007-5201  
Facsimile No.: (202) 298-7570

**IN THE DRAWING FIGURES:**

Kindly substitute Figures 1, 1A, 2 and 3 of the above-identified application with the enclosed four (4) sheets of formal drawings of Figures 1, 1A, 2 and 3, each sheet marked "REPLACEMENT SHEET".